

MEMORANDUM

CH2MHILL

Bunker Hill: Guy Cave Fill Placement Field Trip

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FROM: Jay Dehner/CH2M HILL

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This memorandum summarizes observations from a field trip to Bunker Hill on October 20, 1999 to observe Morrison Knudson's (MK) placement of Reed Landing excavated materials into the Guy Cave area.

I arrived onsite at 9:00 am and met with Al Schuckers and Debbie Angell of MK, and Bill Hudson/CH2M HILL. We discussed current placement status of materials into the Guy Cave area. Al and Debbie indicated that in general they are following the conceptual grades provided by CH2M HILL for placement of the Wardner waste rock materials into the cave area (refer to sketch of July 8, 1999). MK is finding that actual grades and road locations are somewhat different from what was proposed in our conceptual plan, but general configuration is basically the same. Key questions from MK are:

- Safety concerns exist for travel over fill access roads adjacent to rock slump areas in higher areas of lower cave – can they use berms to protect from rock fall over the road?;
- Does MK take fill material into upper cave for grading out the upper cave area with the Reed Landing excavation material (lower cave area cannot take all of the anticipated fill volumes)?

Bill noted that there was a desire from mine owner to potentially site an ore recovery/floatation plant onsite, and that the Guy Cave area is an option. The ore recovery process would have an advantage of disposing fines (with cement addition) into lower mine workings in the area (such as in Utz or Homestake drifts) to plug these drifts off, and assist in reducing inflow of AMD-producing water into the mine over the long-term. This process could be set up over a capped Guy Cave area, but current grading would need to limit the steepness of slopes in the processing area to around 10% or less. Bill will be talking with USEPA about the process in the near future to see if there is a potential interest in pursuing it for the Guy Cave area. Remaining discussions concentrate on the current grading plan that MK is developing for the area.

Field Observations

Lower Cave Area

After our office discussions, we drove up to the Guy Cave area to review the current fill placement. Reed Landing materials were placed in a ramp configuration within the lower cave area that generally follows the conceptual grading plan presented in CH2M HILL's

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memorandum to USEPA dated July 8, 1999. The fill material wrapped along the south wall of the lower cave, ramping up and to the west and north at about a 10% (or less) grade to an intermediate bench/turn area located against the near-vertical north wall. The access ramp then switch-backed up from the turnaround area in a southerly direction, climbing at a greater than 10% slope over to the base of the upper cave area. Fill placement in the lower cave area was estimated by MK to be about 9,000 cubic yards at the time of the visit. No fill was placed in the upper cave area. Total fill quantities to be disposed in the area are estimated at about 23,000 cubic yards.

Embankment slopes were about 2 horizontal to 1 vertical for the lower portion of the fill ramp (up to the turnaround area) and about 1.5:1 for the upper ramp to the upper cave area. The lower fill ramp embankment slopes will be flattened to 3:1 with additional fill and regrading (narrowing) of the current access road. The upper fill embankment side-slopes will remain in a steeper configuration, although some regrading of the upper bench road could reduce side-slope grades of this embankment.

Debbie noted that MK will be developing a digital terrain model from a ground survey to determine where the grades currently are, and how much volume remains in the lower cave area. They will also be surveying the upper cave to determine how much fill can be placed in that area as well. MK estimates that the survey will be completed early next week. MK thought that there would be need for additional disposal area beyond what could be placed in the lower cave.

At the switchback to the upper cave, the access ramp is filled against the blocky rock rubble that is collapsed within the cave area. MK thought that placement of a fill catchment-berm on the ramp edge adjacent to the rubble slope could help to protect truck traffic against rock fall. This may help to catch some of the smaller rocks that are up on this slope, but there are also some very large rocks that the berm may not catch. MK should develop and implement appropriate safety measures for operating in this area.

MK is planning to take drainage from runoff of the lower cave area into a drainage swale that follows the ramp grade down slope, crosses the Guy Cave access road and discharges down slope just north of the Guy Cave area. Rip rap slope stabilization in the access road crossing and in the down slope discharge is planned. Geotextile should also be considered below the rip rap where erodible soil conditions exist.

Upper Cave Area

We walked up the access ramp to the upper cave area. To place materials into the upper cave, the access ramp would need to be excavated through a berm of material at the south-east end of the cave. This is similar to the access shown in CH2M HILL's conceptual grading plan, but MK thought they could construct a turn for the access ramp into the upper cave without having to extend the ramp over to the existing cat-track road that parallels the West Fork (and without blocking the natural drainage that exists there now).

As stated earlier, MK thought there would be need for additional disposal area beyond what could be placed in the lower cave. Should MK place materials in the upper cave? The question of whether materials should be placed in the upper cave needs to be discussed with the USEPA and the State. There is benefit from a drainage (and AMD reduction) standpoint to fill the depression of the upper cave and grade it to drain away from the area so that infiltration is reduced. However, the decision should also consider the characterization of these materials and whether their placement would then dictate capping

of the upper cave area. (Note that capping the Guy Cave area may not be recommended as a priority mitigation measure, based on recent AMD mitigation ranking meetings.)

If filling the cave is determined appropriate, then fill materials would be placed into the upper cave to grade the bottom bowl area to drain over to the access ramp and out to the natural drainage course. MK will be determining the amount of fill that this area can accommodate. Material should be placed in lifts and compacted to reduce infiltration quantities and promote runoff. Note that some trees will have to be removed in order to construct the ramp and place fill within the upper cave.